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Järnmalm – Bestämning av metallisk järnhalt – Järntrikloridtitreringsmetod (ISO 16878:2016, IDT)

Iron ores – Determination of metallic iron content – Iron(III) chloride titrimetric method (ISO 16878:2016, IDT)

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Den internationella standarden ISO 16878:2016 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av ISO 16878:2016.

The International Standard ISO 16878:2016 has the status of a Swedish Standard. This document contains the official version of ISO 16878:2016.

Upplysningar om sakinnehållet i standarden lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00. Standarder kan beställas hos SIS Förlag AB som även lämnar allmänna upplysningar om svensk och utländsk standard.

Information about the content of the standard is available from the Swedish Standards Institute (SIS), telephone +46 8 555 520 00. Standards may be ordered from SIS Förlag AB, who can also provide general information about Swedish and foreign standards.

Denna standard är framtagen av kommittén för Järnmalm, SIS/TK 149.

Har du synpunkter på innehållet i den här standarden, vill du delta i ett kommande revideringsarbete eller vara med och ta fram andra standarder inom området? Gå in på www.sis.se - där hittar du mer information.

Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 102, *Iron ore and direct reduced iron*, Subcommittee SC 2, *Chemical analysis*.

This first edition of ISO 16878 cancels and replaces ISO/TS 16878:2010, which has been technically revised.

Iron ores — Determination of metallic iron content — Iron(III) chloride titrimetric method

CAUTION — This International Standard may involve hazardous operations and equipment. This International Standard does not purport to address all of the safety issues associated with its use. It is the responsibility of the user of this International Standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to its use.

1 Scope

This International Standard specifies a titrimetric method for the determination of the metallic iron content of reduced iron ores.

This method is applicable to a concentration range of 57,5 % mass fraction to 90,5 % mass fraction of the metallic iron.

NOTE The term "metallic iron" means those forms of iron not bonded to oxygen or not present as pyrite.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 385, *Laboratory glassware — Burettes*

ISO 1042, *Laboratory glassware — One-mark volumetric flasks*

ISO 10835, *Direct reduced iron and hot briquetted iron — Sampling and sample preparation*

ISO 11323, *Iron ore and direct reduced iron — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11323 apply.

4 Principle

Iron present in the oxidation state Fe^0 in the sample is oxidized to Fe^{+2} by the action of $FeCl_3$ according to the following reaction:

$$Fe^0 + 2Fe^{+3} \longrightarrow 3Fe^{+2}$$

The Fe^{+2} is titrated with potassium dichromate solution using the sodium diphenylaminesulfonate indicator.

5 Reagents

During the analysis, use only reagents of recognized analytical reagent grade and only distilled water or water of equivalent purity.

5.1 Iron(III) chloride solution.

Add 250 g of iron(III) chloride hexahydrate to a 2 000 ml container holding 600 ml of water and agitate until it is completely dissolved. Dilute with water to a volume of 1 l.

NOTE For better dissolution of the $FeCl_3$, it is recommended to use a warm water bath. The ideal condition is a complete dissolution of the salt resulting in a translucent solution.

5.2 Sulfuric acid, 1,84 g/ml.

5.3 Phosphoric acid, 1,7 g/ml.

5.4 Solution 15 % sulfuric acid/15 % phosphoric acid mixture.

Add 1 000 ml of water to a 3 000 ml beaker. Place the beaker in a cool place and add slowly with stirring 300 ml of phosphoric acid (5.3). Allow cooling. Add slowly with stirring 300 ml of sulfuric acid (5.2) and allow cooling. Dilute this mixture to 2 000 ml with stirring. Store the solution in a 2 000 ml high-density polyethylene bottle or equivalent container.

5.5 Sodium diphenylaminesulfonate.

Dissolve 0,2 g of powdered sodium diphenylaminesulfonate ($C_6H_5NHC_6H_4SO_3Na$) in a small volume of water and dilute to 100 ml.

Store this solution in a brown glass bottle.

5.6 Standard potassium dichromate solution, 0,016 67 mol/l.

Dry potassium dichromate at 150 °C for 3 h. Remove potassium dichromate from the oven and cool to room temperature in a desiccator or over silica gel. For a minimum purity 99,9 % (mass fraction) potassium dichromate weigh 9,808 g into a weighing scoop and transfer qualitatively to a 2 000 ml volumetric flask. Add 1 500 ml of water and dissolve potassium dichromate. When dissolution is complete, make up to volume and mix thoroughly.

5.7 Inert gas, carbon dioxide (CO_2), argon (Ar) or nitrogen (N_2).

6 Apparatus

One mark A-grade volumetric flasks complying with the specifications of ISO 1042 and the following.

6.1 Analytical balance, capable of weighing to the nearest 0,1 mg.

6.2 Erlenmeyer flask, widemouth (500 ml).

6.3 Stopper, to fit Erlenmeyer flask, modified to allow the inert gas to pass through the beaker.

6.4 Magnet stirrer, with magnetic stirring bar.

6.5 Measuring cylinder, of appropriate volume.

6.6 A grade burette, mark A, complying with the specifications of ISO 385.

6.7 Non-magnetic spatula.